

### **REMARKS**

The specification has been amended to substitute the term “machine direction” for the term “longitudinal” at pages 6 and 11. These terms were used interchangeably throughout the application.

A typographical error has been corrected at page 2, line 12. The term “binder precursor” has been amended to “abrasive slurry”. Support for the amendment may be found throughout the text of the paragraph at page 2, lines 3-13. A second typographical error has been corrected at page 2, line 13. A stray character “b” has been deleted.

Claims 1 and 20 have been amended to address 35 U.S.C. 112, second paragraph rejections. Support for the amendments may be found in the specification, for example, at page 12, line 11-27.

Claims 12 and 25 have been amended to recite “machine direction axis” rather than “longitudinal axis”. These terms are used interchangeably in the application. Support for the amendments may be found in claims 9 and 22, respectively.

Supporting text has been added for proposed Figure 5a. Support may be found in the specification, for example, at page 12, lines 3-10 and page 15, line 11 to page 17, line 29.

With entry of the amendments, claims 1-32 are pending in the application.

**The drawings have been objected to under 37 CFR 1.83(a) for failing to shown every feature of the invention specified in the claims.**

Enclosed herewith is proposed new Figure 5a. Figure 5a shows an abrasive article of the present invention having truncated pyramidal protrusions. Such abrasive articles are described in the specification, for example, at page 15, line 11 to page 17, line 29. No new matter has been added.

The term “longitudinal axis” has been cancelled from the claims and substituted with the term “machine direction”. The machine direction is shown, for example, in Figures 4-5 where it is labeled with “M” (see, page 11, lines 16-18).

**Claims 3, 4 and 8-19 have been objected to because they fail to further limit the parent claim.**

The objection of claims 3, 4 and 8-19 based upon the premise that they fail to further limit the parent claim cannot be agreed to by Applicants. Applicants direct the Examiner's attention to MPEP 608.01(n) Infringement Test which states that:

“The test as to whether a claim is a proper dependent claim is that it shall include every limitation of the claim from which it depends (35 U.S.C. 112, fourth paragraph), or in other words that it shall not conceivably be infringed by anything which would also not infringe the basic claim. A dependent claim does not lack compliance with 35 U.S.C. 112, fourth paragraph, simply because there is a question as to (1) the significance of the further limitation added by the dependent claim, or (2) whether the further limitation in fact changes the scope of the dependent claim from that of the parent claim from which it depends. The test for a proper dependent claim under the fourth paragraph of 35 U.S.C. 112 is whether the dependent claim includes every limitation of the claim from which it depends. The test is not one of whether the claims differ in scope.”

In view of the foregoing, it is submitted that the objection to claims 3, 4 and 8-19 because they fail to further limit the parent claim is improper and should be withdrawn.

**Claims 1-32 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claims 1, 12, 20, and 25 have been amended to address the rejections under 35 U.S.C. 112, second paragraph. With the amendments to claims 1, 12, 20 and 25, it is believed that the rejections under 35 U.S.C. 112, second paragraph have been overcome and should be withdrawn.

**Claims 20-26 and 28-32 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,570,409 (Martin et al.).**

Martin et al. reports abrasive articles having a diamond-like coating and methods for making same. The abrasive articles of Martin et al. include abrasive

particles adhered to a make coating (see, FIGS. 1-3) or dispersed throughout a slurry coating (see, FIG. 4). Martin et al. does not teach or suggest Applicant's claimed abrasive articles which comprise an abrasive coating consisting essentially of a hardened binder coating having a first surface adhered to a backing and a second structured surface comprising a plurality of precisely-shaped protrusions; and a diamond-like carbon coating superposed and adhered to at least a portion of the structured surface of the hardened binder coating. The use of the phrase *consisting essentially of* is intended to exclude abrasive particles from the abrasive coating. Applicant's teach that the presently claimed abrasive articles are useful, for example, in mechanically treating rigid disk substrates. Abrasive articles of the present invention provide advantage, for example, in mechanically treating rigid disk substrates since they do not contaminate the substrate with loose abrasive particles that may become embedded in the surface of the rigid disk substrates. Such contamination may cause damage to the sensitive heads used in modern disk drives and/or may result in quality problems with the resulting memory disk.

In view of the foregoing, it is submitted that the rejection of claims 20-26 and 28-32 under 35 U.S.C. §102(b) as being anticipated by Martin et al. should be withdrawn.

**Claims 1-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Martin et al. in view of U.S. Patent No. 5,733,178 (Ohishi).**

The Office Action states "[o]hishi discloses all of the limitations of claims 1 and 20, except for disclosing the diamond-like coating. Martin et al. teaches an abrasive article having a diamond like coating layer. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the article of Ohishi with diamond-like coating as taught by Martin et al. to improve cutting performance."

Applicants cannot agree with the position taken in the Office Action. Ohishi reports a method for texturing magnetic recording media substrates using a structured abrasive article including a flexible backing having a major surface and an abrasive

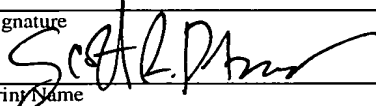
coating including a plurality of precisely-shaped three-dimensional abrasive composites. The abrasive composites comprise a plurality of abrasive particles dispersed in a binder which binder provides the means for attachment of the composites to the backing. The abrasive articles used in Ohishi contain conventional abrasive particles that are dispersed in a cured binder. Ohishi does not teach or suggest an abrasive article having an abrasive coating that is free of abrasive particles and having a diamond-like carbon coating.

The Office Action supplements Ohishi with Martin et al. to provide an abrasive article having a diamond-like carbon coating. However, as argued above, Martin et al. is deficient in that it does not teach or suggest an abrasive article having an abrasive coating that is free of abrasive particles. As taught in the present specification, abrasive articles having an abrasive coating consisting essentially of a structured surface comprising a plurality of precisely-shaped protrusions and a diamond-like carbon coating are particularly suitable in mechanically treating a rigid disk substrates. Since the abrasive articles of the present invention are free of abrasive particles the abrasive articles cannot contaminate the substrate with abrasive particles that are sloughed off the abrasive article during the mechanical treatment.

In view of the above, it is submitted that the rejection of claims 1-32 under 35 U.S.C. §103(a) as being unpatentable over Martin et al. in view of Ohishi should be withdrawn.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION**

Page 2 at line 3.

The texturing process is traditionally accomplished by using a loose abrasive slurry. The loose abrasive slurries provide substantially circumferential scratches that have sharply defined edges having the requisite depth. Loose abrasive slurries are, however, accompanied by a number of disadvantages. For instance, the loose abrasive slurries create a large amount of debris and waste. As a result, the thin film rigid disks must be thoroughly cleaned to remove any residues left on their surface from the binder precursor. Also, abrasive particles from the abrasive slurry may become embedded in the surface of the rigid disks which may cause damage to the sensitive MR heads used in modern disk drives. Finally, the loose [binder precursor] abrasive slurry also results in a relatively high amount of wear on the equipment used for texturing. [b]

Page 6 at line 19.

In another embodiment, the parallel elongate ridges each comprise a continuous protrusion of hardened binder extending continuously between the side edges of the backing. In another embodiment, the continuous protrusion is a pyramidal shape having an apex and sides, the sides intersecting at said apex to form an angle therebetween of from about 70 to about 110 degrees. In another embodiment, the ridges each comprise a plurality of separate precisely-shaped protrusions aligned with transverse centers located on said [longitudinal] machine direction axis.

Page 11 at line 23.

In another embodiment of the invention, the abrasive ridges each comprise a continuous line of upraised binder material. In an alternate embodiment of the invention, the abrasive ridges each comprise a plurality of separate precisely-shaped

protrusions that are aligned with transverse centers located on said [longitudinal] machine direction axis or its imaginary extension line. In a preferred embodiment, the abrasive ridges are comprised of a plurality of individual composites that are intermittently spaced along the aforesaid [longitudinal] machine direction line, wherein each of the abrasive composites is precisely shaped and comprises a plurality of abrasive particles dispersed in a binder, which binder provides a means of attachment of the abrasive composites to the aforesaid surface.

### IN THE CLAIMS

1 (amended). A method of mechanically treating a substrate, the method comprising the steps of:

(a) providing a substrate for mechanical treatment, the substrate selected from the group consisting of a rigid disk or a rigid disk substrate;  
(b) providing an abrasive article in contact with the substrate at a pressure, the abrasive article comprising:

a backing having a first major surface and a second major surface; and

an abrasive coating consisting essentially of:

a hardened binder coating having a first surface adhered to the [flexible] backing and a second structured surface comprising a plurality of precisely-shaped protrusions; and

a diamond-like carbon coating superposed and adhered to at least a portion of the structured surface of the hardened binder coating; and

(c) moving at least one of the substrate and the abrasive article relative to the other to provide the mechanical treatment.

12 (amended). The method of claim 9, wherein said ridges each comprise a plurality of separate precisely-shaped protrusions aligned with transverse centers located on said [longitudinal] machine direction axis.

20 (amended). An abrasive article comprising:

- a backing having a first major surface and a second major surface; and

- an abrasive coating consisting essentially of:

- a hardened binder coating having a first surface adhered to the [flexible] backing and a second structured surface comprising a plurality of precisely-shaped protrusions; and

- a diamond-like carbon coating superposed and adhered to at least a portion of the structured surface of the hardened binder coating.

25 (amended). The abrasive article of claim 22, wherein said ridges each comprise a plurality of separate precisely-shaped protrusions aligned with transverse centers located on said [longitudinal] machine direction axis.